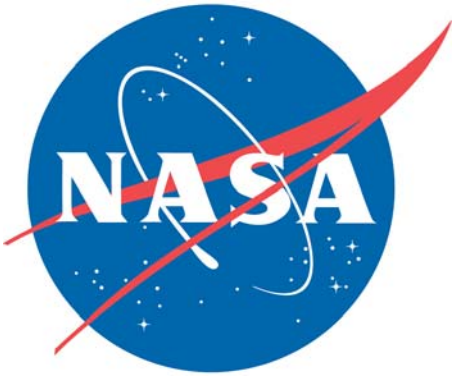

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National Aeronautics and Space Administration

Release Date August 16, 2004

Earth Science Enterprise
NN-H-04-Z-YS-008-N

RESEARCH ANNOUNCEMENT

NASA – Modeling, Analysis and Prediction

Including contributions from:

Climate Variability and Change Focus Area
Climate and Radiation Sciences

This is the Initial release of this Research Announcement

Proposals due – November 16, 2004

OMB Approval No. 2700-0087

NASA – Modeling, Analysis and Prediction

Including contributions from:

Climate Variability and Change Focus Area
Climate and Radiation Sciences

NASA Research & Applications
Initial Announcement Soliciting Proposals
for the
Period Ending
November 16, 2004

NN-H-04-Z-YS-008-N
Issued: August 16, 2004
Catalog of Federal Domestic Assistance (CFDA) Number: XX.XXX

Office of Earth Science
National Aeronautics and Space Administration
Washington, DC 20546

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NASA RESEARCH ANNOUNCEMENT

Including contributions from:

Climate Variability and Change Focus Area
Climate and Radiation Sciences

I. FUNDING OPPORTUNITY DESCRIPTION

A. Overview

The NASA vision is: *To improve life here*
To extend life to there
To find life beyond

The NASA mission is: *To understand and protect our home planet*
To explore the Universe and search for life
To inspire the next generation of explorers

…as only NASA can.

The NASA Earth Science Enterprise is seeking to fulfill the agency's vision and carry out its mission, which is articulated in the NASA 2003 Strategy (http://www.nasa.gov/pdf/1968main_strategi.pdf). The ESE mission is to understand and protect our home planet by using our view from space to study the Earth system and improve predictions of Earth system change. This mission is articulated in a series of documents, including the Earth Science Strategy, the Research Plan, and the Applications Plan (http://www.earth.nasa.gov/visions/index.html). The ESE, working with its domestic and international partners, provides accurate, objective scientific data and analyses to advance our understanding of Earth system processes and to help policy makers and citizens achieve economic growth and effective, responsible stewardship of Earth's resources. The ESE research program aims to acquire deeper scientific understanding of the components of the Earth system, their interactions, and the consequences of changes in the Earth system for life. These interactions occur on a continuum of temporal and spatial scales ranging from short-term weather to long-term climate and motions of the solid Earth, and from local and

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regional to global.

The frontier of Earth system science is to: (1) identify and quantify Sun-Earth connections associated with solar variability and impact on the Earth System; (2) explore interactions among the major components of the Earth system: continents, oceans, atmosphere, ice, and life; (3) distinguish natural from human-induced causes of change; and (4) understand and predict the consequences of change. NASA has established six scientific focus areas for these complex processes: Atmospheric Composition, Carbon Cycle and Ecosystems, Climate Variability and Change, Earth Surface and Interior, Water and Energy Cycle, and Weather. Roadmaps have been developed to summarize the technology, observations, modeling, field campaigns, basic research, and partnerships needed over time to achieve the long-term goals for each of these focus areas (http://earth.nasa.gov/roadmaps). The roadmap for the Climate Variability and Change focus area provides the strategic framework for research under this NASA Research Announcement (NRA). ESE focus areas are interrelated and are integrated to achieve a fully interactive and realistic Earth system representation. The opportunities for research offered in this NRA fall within the Climate Variability and Change focus area. There are strong interrelationships among focus areas that must not be overlooked in research plans. Separate research announcements have been released for other ESE-focus areas (http://research.hq.nasa.gov/code_y/open.cfm); in particular, please note the following NRAs: Oceans and Ice, NASA Energy and Water Cycle , Carbon Cycle Science and Tropical Cloud Systems and Processes.

Five fundamental questions drive ESE research:

- How is the global Earth system changing?
- What are the primary causes of change in the Earth system?
- How does the Earth system respond to natural and human-induced changes?
- What are the consequences of change in the Earth system for human civilization?
- How will the Earth system change in the future?

B. This NRA

The core questions above represent a paradigm of forcing, response, and the processes that link these and maintain feedbacks within the Earth system. The topics called out by this NRA will help ESE to answer, either in full or in part, the following subset of the Enterprise's 24 second-tier research questions related to the Climate variability and Change focus area:

- How are global precipitation, evaporation, and the cycling of water changing?
- How is the global ocean circulation varying on interannual, decadal, and longer time scales?
- What trends in atmospheric constituents and solar radiation are driving global climate?
- What are the effects of clouds and surface hydrologic processes on Earth's climate?
- What are the effects of regional pollution on the global atmosphere, and the effects of global chemical and climate changes on regional air quality?
- How can weather forecast duration and reliability be improved?
- How can predictions of climate variability and change be improved?
- How well can transient climate variations be understood and predicted?
- How well can long-term climatic trends be assessed or predicted?
- How well can future atmospheric chemical impacts on ozone and climate be predicted?

This NRA invites proposals that include research and applications development in four areas: (1) the Global Modeling and Assimilation Office (GMAO) [the merged EOS Data Assimilation Office at Goddard Space Flight Center (GSFC) and the NASA Seasonal-to-Interannual Prediction Project (NSIPP)]; (2) the NASA Goddard Institute for Space Studies (GISS) research supporting modeling and analysis; (3) a new Cloud Modeling and Analysis Initiative (CMAI) to utilize surface, *in situ* and satellite remote sensing data toward improvement of cloud model representation in climate and weather models; and (4) the NASA Global Modeling Initiative (GMI). Each area is described briefly below with expanded information provided at identified Web sites. NASA intends to focus its modeling and assimilation activities with a long-term goal of consistent coupled models with a strong foundation in its satellite and related data program.

Significant, multi-investigator proposals required to support major model and applications development or for development and operation of next generation assimilation systems may range up to $5M/year and should include budgets for five (5) years. These proposals should emphasize enabling activities such as providing models and modeling products to the research community. Smaller-scale proposals should not exceed $500K/year with three (3) year duration grants. Proposals that include significant partnerships across agency boundaries are encouraged. Of particular interest are partnerships that enhance NASA's contributions to the Climate Change Science Program (http://www.climatescience.gov/). It is anticipated that the smaller-scale proposals will emphasize the analysis and evaluation of

model output, the use of model results to address the science questions outlined in the ESE Strategy, and the development and testing of new model components (including process parameterization) and/or algorithms that may lead to new scientific insights and enhanced model performance and/or efficiency. Where appropriate, individual investigators may be granted "team membership" in association with any of the elements of the multi-investigator activities defined above. As part of the competition process, scientists may submit proposals for one or more of the above elements.

Responsibilities, particularly for large, multi-investigator proposals will include managing a balance among these areas, interaction with the satellite remote sensing community, support to field missions and collaboration on parallel development of next generation models and assimilation. Multi-investigator proposals are encouraged to include substantive collaborations or partnerships with multiple universities, NASA centers and/or other agencies and the equivalent of team leader and team member activities.

NASA serves to collect, validate, and prove the utility of a wide range of Earth observations from more than 20 research satellites carrying over 80 sensors. NASA's contribution to federal activities in climate modeling and analysis is anchored around evaluating the impact of these observations. In addition, NASA's modeling program contributes to the validation of the observations, and in turn, the observations contribute to the validation and improvement of model processes. Proposals should have a focus on utilization of observations in modeling activities and state explicitly how NASA's observation-based mission will benefit. Innovative use of observations to evaluate and improve model performance and address key model uncertainties is encouraged.

Separate resources to support computation requirements will be reserved to provide the necessary computing systems and to make needed investments in software that enable the efficient operation of the models being developed and the analysis proposed. Specific guidelines and a point of contact are provided in Appendix A for those proposals requiring 'high-end' computer resources. Requests for the available NASA resource will be used to assess the ESE computer resource requirements. 'High-end' requests in this NRA will be model applications that efficiently utilize 10's to 100's of processors. For those proposals requiring low to moderate computer resources, requests for upgrades to existing systems will be considered in the context of balancing computer resources against the total resources available for successful proposals.

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New model and applications development should include the necessary resources to assure compliance with the US multi-agency Earth System Modeling Framework (ESMF) (http://www.esmf.ucar.edu/). Investigators developing proposals that will lead to a new model, model element or application will be supported to provide this integration. Independent resources will be allocated to the ESMF core team to provide software engineering and interface support to the investigator to assure that the final product meets ESMF standards and investigator verification that the ESMF-compatible product yields accurate results. For further information contact Richard B. Rood, Code 930, NASA/GSFC, Greenbelt, MD 20771; Richard.B.Rood@nasa.gov , 301-286-8834.

B.1 Global Modeling and Assimilation Office (GMAO)

(http://gmao.gsfc.nasa.gov/sci_research/)

The Global Modeling and Assimilation Office (GMAO) currently includes three major thrusts:

(1) development, maintenance and support to the community of state-of-the-art data assimilation systems;

(2) model and applications development to support current and next generation data assimilation systems, climate and weather variability, change and prediction and NASA observations, from surface, *in situ* and space platforms.

(3) reanalysis in support of EOS satellite data analysis and climate and weather research.

The elements identified are not mutually exclusive and require interactive development. In March 2005, GMAO will deliver the next generation NASA modeling and assimilation system, GEOS5. This system will represent a new paradigm for systems development, in that GEOS5 is being developed within ESMF and in that context is integrating model elements from different agency and community investments. Thus, as funding for this NRA is anticipated to commence in April 2005, proposals supporting development of the NASA sponsored next generation system are encouraged.

Proposals to support this class of activities will contribute to, for instance, the development of:

(a) the capability to provide assimilated data products that can be used by EOS instruments as part of their retrieval algorithms to produce products for distribution to the research community;

(b) the capability to produce assimilated data sets of basic meteorological parameters (e.g., retrospective analysis) that can be used by the research community to address the research questions in the ESE Strategy;
(c) the capability to produce assimilated data sets for new kinds of ESE data (especially those from EOS satellite instruments and data from future Earth System Science Pathfinder satellites).
(d) weather and climate research, including prediction, that is enabled by improved representation of initial conditions and physical processes made possible by new types of satellite observations
(e) modeling systems, especially those needed to ensure that the benefits of new types of satellite data are included in modeling and data assimilation systems as early as possible.
(f) the capability to execute Observing System Experiments (OSEs) and Observing System Simulation Experiments (OSSEs) that provide intelligent guidance on the development of future observing systems.

B.2 Goddard Institute for Space Studies (GISS)

(http://www.giss.nasa.gov/research/)

Research at the Goddard Institute for Space Studies (GISS) emphasizes global change, an interdisciplinary research activity addressing natural and man-made changes in our environment which occur on various time scales from decades to millennia and which affect the habitability of our planet. The research combines analysis of comprehensive global datasets with global models of atmospheric, land surface, and oceanic processes and includes study of past events on Earth such as paleoclimate and the study of other planets as an aid to prediction of future evolution of Earth on a planetary scale. Proposals that support continued development and maintenance of this national asset are encouraged.

Proposals to support this class of activities may include, for instance, investigation of:

(a) long-term climate research, especially those that include incorporation of NASA satellite data for improved representation of climate forcings and feedbacks
(b) model coupling, model process parameterization, and characterization of model sensitivity to climate forcings. Processes of interest include water vapor feedbacks, cloud formation, the southern hemisphere sea ice response, land cover change and changes in snow albedo. Model sensitivities to aerosol

forcing and solar forcing are also of interest. In addition, the sensitivity of the tropical region to climate change is a critical area.

(c) development of models capable of seasonal climate prediction at regional scales. Topics of interest include the effect of temperature gradients and land and surface evaporative responses on precipitation.

(d) improved ocean circulation models with ice and atmosphere coupling to improve ocean heat transport in climate models. Particular emphasis on changes in the North American deep water response is sought

(e) improved model estimates of ice sheet contributions to sea level rise. Key issues include the functional dependence of the southern hemisphere sea ice response to climate change.

B.3 Cloud Modeling and Analysis Initiative (CMAI)

Representation of clouds in climate and weather models, e.g. within those models identified within B.1 and B.2, is considered one of the central issues driving uncertainties in climate and weather modeling. NASA's goal is to incorporate satellite observations to not only evaluate cloud process models, but to extend our understanding of clouds in climate and weather models to the global scale. Proposals are sought that effectively utilize both in situ and satellite datasets to further our understanding of clouds and provide realistic impacts of clouds in climate and weather models. With the launch of CALIPSO and CloudSat in March 2005 into the orbit that contains Aqua and Aura, this constellation of satellite sensors will allow unprecedented opportunities for cloud observation analysis in support of cloud system modeling. NASA encourages a focus on analysis of integrated datasets from this constellation of satellites in response to this NRA and to future solicitations. Within the context of the CMAI, critical topics that this NRA seeks to address include:

(1) Cloud formation processes: quantify the mass flow rate of vapor-to-condensate for liquid clouds and for ice clouds (including freezing and supersaturation effects).

(2) Precipitation formation processes: quantify the mass flow rate of cloud condensate to precipitation form (collisional growth process), both rain and snow.

(3) Cloud lifecycle dynamics: quantify the scale dependence of the coupling of dynamics with radiation and precipitation by clouds necessary to generalize findings so that they can be accurately and effectively represented in climate (Earth System) models.

(4) Orographic effects: similar to (3) but with a particular focus on quantifying the effects of orography on cloud-precipitation behavior.

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In (1)-(3) above, how does the presence of a changing aerosol environment influence cloud lifetime and precipitation?

To facilitate the synthesis of field and satellite observations, cloud-resolving and global models, funded proposers will be expected to contribute to the augmentation of an enhanced version of the GEWEX Cloud System Study Data Integration for Model Evaluation (GCSS-DIME) Web site (http://gcss-dime.giss.nasa.gov/) in one or more of the following ways: (1) providing either a hyperlink to a Web site containing the assembled collection of field datasets employed in the investigator's own study or providing the datasets themselves, (2) providing 'cloud object' statistical results (e.g., composites, multi-dimensional histograms) and/or the software tools for producing them from global long-term satellite observations and global model output, (3) providing statistics from large ensembles of cloud-resolving model runs that can be used to develop and test cloud-precipitation parameterizations, and (4) providing statistics relating the general circulation to cloud property distributions and quantifying how these relations change with changing climate in GCM ensembles.

B.4 The Global Modeling Initiative (GMI) http://gmi.gsfc.nasa.gov/mission.html

The Global Modeling Initiative (GMI) has developed a modular chemical-transport model (CTM) with the ability to incorporate different components and inputs, such as meteorological fields, chemical and microphysical mechanisms, numerical methods, source gas emissions, and other modules representing the different approaches of current models, as well as carry out multiyear assessment simulations. At present, GMI has concentrated on evaluating the variability of simulated atmospheric composition due to incorporation of meteorological input from different free running general circulation models and assimilated data; this effort will be expanded to include studies of the variability due to other model processes. The goals of the GMI effort are:

(a) Reduce uncertainties in model results and predictions by understanding the processes that contribute most to this variability, and by evaluation of model results against existing and forthcoming observations of atmospheric composition.

(b) Understand the coupling between atmospheric composition and climate through coordination with climate models.

(c) Contribute to the assessment of the anthropogenic perturbations to the Earth system.

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This announcement solicits research activities primarily in, but not restricted to, the following areas:

(a) Incorporation and evaluation of state-of-the-art algorithms and inclusion of new surface, *in situ* and satellite remote sensing data into the GMI model with the goal of understanding their relative importance in determining simulated atmospheric composition. High priority will be given to studies incorporating new satellite-based meteorological fields, wet scavenging processes, emission of source gases, boundary layer processes, microphysical processes, chemical mechanisms and numerical approaches. Research efforts towards off-line incorporation of GCM processes such as convective parameterizations, hydrological cycle and aerosol-cloud interactions are also encouraged.

(b) Evaluation of GMI simulation results with available surface, *in situ* and satellite remote sensing data. Priority will be given to studies utilizing available and forthcoming measurements from satellite instruments and aircraft platforms.

(c) Studies of the impact of anthropogenic activity and climate change on atmospheric composition at both regional and global scales, incorporating the coupling between the stratosphere and the troposphere incorporating satellite observations.

(d) Studies of the radiative impact of atmospheric composition as simulated by the GMI model. Priority will be given to efforts that include coordination with climate models and interactive chemistry-climate research.

Although the current model is an offline Chemical Transport Model (CTM), the need to address chemical-aerosol-climate coupling will require coupled models in the future. Proposals are encouraged that help define the bridge to using coupled models in GMI and to identify any continuing role of the offline CTM in the context of support to NASA's continued development of model evaluation utilizing satellite observations,

NASA plans to initiate an integration of its research modeling activities to focus the research among NASA crosscutting themes. Over the tenure of the grants from this NRA the MAP program will enhance ESMF compliant modeling and assimilation resources to support the broader research programs of the Earth Science Enterprise and the US Climate Change Science Program (CCSP) (http://www.climatescience.gov/). This will require the delivery and maintenance of software for the MAP program. NASA expects to support a Core

Integration Team that will have responsibility to assist funded scientists in this software delivery. This research software will include contributions from the multi-investigator teams as well as contributions from the smaller-scale proposals. The following elements are expected to be part of the MAP program: Core Integration Team, a set of Earth System model application-driven and data-driven development activities, and a set of Earth System Science applications utilizing NASA funded models that may include modules developed externally, but integrated through collaboration and the ESMF (e.g. GEOS5). Multi-investigator teams will be expected to participate formally in the development of the MAP modeling environment.

As guidance, in the third year of the current proposal cycle the activities residing in the multi-investigator proposals will converge into a shared MAP modeling environment. This environment will be ESMF compliant and investigators will be able to configure model and assimilation systems to support specific applications. There will be planned releases of major development cycles in support of MAP priorities. The Core Integration Team, which will receive software deliveries from the development activities and will have prime responsibility for managing the MAP modeling environment. Successful research teams will include resources to provide an effective interface with the Core Integration Team. Development and application teams will assume primary responsibility for evaluation and certification of major development cycles. The MAP program will evolve the structure and management over the first two years of this proposal cycle.

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II. AWARD INFORMATION

A. Terms and Level of Funding Available

Funds are not currently available for awards under this NRA. The Government's obligation to make award(s) is contingent upon the availability of appropriated funds from payment can be made and the receipt of proposals that NASA determines are acceptable for award under this NRA. The anticipated levels of available funding and the guidance for project sizes for the various components of this NRA are summarized below. It is estimated that ~$20M per year will be awarded. The Government anticipates several multi-investigator proposals will be funded ranging up to ~$5M/year. Smaller-scale proposals should not exceed $500K/year with three(3) year duration grants. In addition, ~$2M/year will be allocated in the area of GMI and ~$2M/year will be allocated in the CMAI. The Government reserves the right to reallocate the funds as needed.

B. Commercially Available Data Sets

NASA's Earth Science Enterprise has adopted commercial remote sensing data purchases as a mainstream way of acquiring research-quality data, as these commercial capabilities become available. NASA encourages the use of commercially available data sets by Principal Investigators as long as they meet scientific requirements and are cost-effective. When responding to this NRA, the proposer should identify the commercial data sources intended for use and the associated cost. Costs for any other types of required data should also be identified in the budget request.

C. Standards for Proposing

All policies and procedures for the preparation and submission of proposals, as well as those for NASA's review and selection of proposals for funding, are now presented in a separate document entitled "Guidebook for Proposers Responding to NASA Research Announcements" (http://www.hq.nasa.gov/office/procurement/nraguidebook/).

By reference, the newest edition of this "Guidebook for Proposers Responding to a NASA Research Announcement" (January 2004) is hereby incorporated into this NRA, and proposers to this NRA are responsible for understanding and complying with its procedures before preparing and submitting their proposals. Proposal that do not conform to its standard may be declared noncompliant and returned without review.

The other chapters and appendices of this "Guidebook for Proposers Responding to a NASA Research Announcement" provide supplemental information about the entire NRA process,

including NASA policies for the solicitation of proposal, guidelines for writing complete and effective proposals, the NASA policies and procedures for the review and selection of proposals as well as for issuing and managing the awards to the institutions that submitted selected proposals, and Frequently Asked Questions (FAQ's) about a variety of the NASA proposal and award processes and procedures. Note that the NASA policy for proposals involving non-U.S. participants is given in Section (1) of Appendix B of this Guidebook.

Safety is a top priority for all of NASA's programs. As such, all proposers should regard the following statement:

> "Safety is the freedom from those conditions that can cause death, injury, occupational illness, damage to or loss of equipment or property, or damage to the environment. NASA's safety priority is to protect: (1) the public, (2) astronauts and pilots, (3) the NASA workforce (including employees working under NASA award instruments), and (4) high-value equipment and property."

Proposers should be aware that funds are not currently available for awards under this announcement. The Government's obligation to make award(s) is contingent upon the availability of appropriated funds from which payment can be made and the receipt of proposals that NASA determines are acceptable for award under this announcement.

III. ELIGIBILITY INFORMATION

A. Eligible Applicants

Participation in this program is open to all categories of U.S. and non-U.S. organizations, including educational institutions, industry, nonprofit institutions, as well as NASA centers, and other U.S. Government agencies. Historically Black Colleges and Universities, other minority educational institutions, and small businesses and organizations owned and controlled by socially and economically disadvantaged individuals or women are particularly encouraged to apply. Participation by-non-U.S. organizations in this program is encouraged subject to NASA's policy of no-exchange-of-funds. Participation by non-U.S. institutions must be proposed within the specific guidelines described in Appendix C, sections (l) and (m), which include a no-exchange-of-funds provision. Further information on foreign participation is provide in Section §1260.12(e), "Choice of award instrument" of the NASA Grant and Cooperative Agreement Handbook. This Handbook is located at: http://ec.msfc.nasa.gov/hq/grcover.htm."

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B. Cost Sharing or Matching

If an institution of higher education, hospital, or other non-profit organization wants to receive a grant or cooperative agreement, cost sharing is not required: however, NASA can accept cost sharing if it is voluntarily offered. Section B, Provision §1260.123, "Cost sharing or matching" describes the acceptable forms of cost sharing. If a commercial organization wants to receive a grant or cooperative agreement, cost sharing is required, unless the commercial organization can demonstrate that they will not receive substantial compensating benefits for performance of the work. If no substantial compensating benefits will be received, then cost sharing is not required, but can be accepted. Section D, Provision §1274.204, "Costs and Payments" of the NASA Grant and Cooperative Agreement Handbook describes the acceptable forms of cost sharing."

IV. PROPOSAL AND SUBMISSION INFORMATION

A. Source of Application Materials

All applicants must provide the Dun and Bradsteet (D&B) data Universal Numbering System (DUNS) number for their organization in the Cover Page of their proposal. Responses to this NRA are all considered prospective new awards, but note that for other NASA announcements requests for renewals of awards will also require a DUNS number. The DUNS number is a unique nine-character identification number provided by the commercial company Dun & Bradstreet. Applicants may call D&B at 1-866-705-5711 to register and obtain a DUNS number, or access the D&B Web site (http://www.dnb.com/us/). The process to request a DUNS number by telephone take about 10 minutes and is free of charge. The process to obtain a DUNS number through the Web site takes about fourteen days, and is also free of charge. Organizations will use the same DUNS number with every proposal submitted for a Federal grant and cooperative agreement. Note that the DUNS number is site-specific.

NASA also requires the applicant's organization to be registered in the Central Contractor Registration (CCR) database and obtain a Commercial and Government Entity (CAGE) code prior to submitting a proposal. The purpose of this requirement is to help centralize information about grant recipients and provide a central location for grant recipients to change organizational information. Information for registering in the CCR and online documents can be found at Web site (http://www.ccr.gov). Before registering applicants and

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recipients should review the Central Contractor Registration Handbook, which is also located at Web site (http://www.ccr.gov). The process for obtaining a CAGE code is incorporated into the CCR registration.

B. Content and Form of the Application Submission

Details on the proposal format, content, and order of materials are provided in Appendix B and Appendix C. Proposers are urged to read the information in these appendices carefully and to follow the specific guidelines.

C. Proposal Submission Dates, Time, and Location

A complete schedule for this opportunity is given below:

Release Date	August 16, 2004
Notice of Intent Due:	September 16, 2004
Proposals due:	4:00 p.m., EST, November 16, 2004

All due dates and times refer to the deadline by which the agency must have received the proposals, regardless of submission method (e.g. mail, electronic, or personal/courier delivery).

The following items apply only to this announcement.

Identifier: NN-H-04-Z-YS-008-N

Submit Proposals to:
MAP 2004 NRA
NASA Peer Review Services, Code Y
500 E Street, SW
Suite 200
Washington, DC 20024-2760

For overnight mail delivery purposes, the recipient telephone number is (202) 479-9030.

Number of Copies Required: 20

D. Proposal Funding Restrictions

The information in section II.A. Terms and Level of Funding Available provides an estimate of the funds expected to be available for competition through this NRA, as well as the approximate number of awards these funds are expected to support.

- Construction of facilities is not an allowed activity.

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- Travel, including foreign travel, is allowed as may be necessary for the meaningful completion of the proposed investigation, as well as for the publicizing its results at an appropriate professional meeting.
- U.S. research award recipients may directly purchase supplies and/or services that do not constitute research from non-U.S. sources, but award funds may not be used to fund research carried out by non-U.S. organizations. However, subject to possible export control restrictions, foreign nationals may conduct research while employed by a U.S. organization.
- Regardless of whether function as a team lead or as a team member, personnel from NASA Centers must propose budgets based on Full Cost Accounting (FCA). Non-NASA U.S. Government organizations should propose based on FCA unless no such standards are in effect; in that case such proposers should follow the Managerial Cost Accounting Standards for the Federal Government as recommended by the Federal Accounting Standards Advisory Board (for further information, see http://www.hq.nasa.gov/fullcost/).

E. Additional Information

Appendix B provides amendatory guidance to the general guidelines for responding to NASA Research Announcements, contained in Appendix C, specific to this interdisciplinary research program, information on required proposal format and content, and the proposal evaluation criteria. Appendix C contains instructions for foreign participation in this opportunity. Appendices D and E contain information about and a sample proposal cover sheet with required institutional declarations in Appendix D. Appendix F contains the budget summary form. If electronic access is not available to prospective proposers, a hard copy of relevant reference(s) can be requested by calling (202) 358-3552 and leaving a voice mail message. Please leave your full name and address, including zip code, and telephone number, including area code. *Prospective investigators are urged to read the information in all of the appendices carefully and to follow completely the specific guidelines therein.*

For proposals responding to this NRA the NASA Selecting Official is Dr. Jack A. Kaye, Director, Research Division, Office of Earth Science.

F. Notice of Intent

All prospective proposers are strongly encouraged to submit a notice of intent to propose in response to this announcement by the close of business on September 16, 2004. This notice

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will help to expedite planning for the proposal review process. The notice of intent may be submitted electronically through the Internet by completing the forms at Web site (http://www.earth.nasa.gov/LOI). You are urged to use these electronic notice of intent forms unless you do not have access to the Internet. In that case, we will accept a FAX copy sent to 202-554-3024 with the following information:

- PI and CoI names and addresses, (including Zip + 4)
- NRA Identifier
- Title of proposal
- Telephone number
- Fax number
- Email address

A brief summary of your proposal. (Please limit this summary to no more than 3000 characters).

V. PROPOSAL REVIEW INFORMATION

A. Evaluation Criteria

The Evaluation Criteria for proposals will be intrinsic scientific and technical merit, its relevance to NASA's stated objectives, and its cost realism and reasonableness. See Appendix B for further discussion of these criteria.

B. Review and Selection Processes

All proposals will be subjected to a full peer review and may include external reviewers, which may involve a mail review, a panel review, or both. This will be followed by a programmatic review in which NASA managers will assess program balance across the competitive range of proposals and evaluate any logistical, implementation, cost, and/or management concerns.

C. Selection Announcement and Award Dates

NASA's stated goal is to announce selections within 150 days of the proposal due date. For this solicitation this period will correspond to the time between the due date of the proposals and selections. Proposers may contact the responsible Program Officer listed in section VII. Contacts if communication has not occurred within this time period.

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Those proposers not selected for award will be notified by mail and offered a debriefing consistent with the policy in Section C.6 of the NASA *Guidebook for Proposers*.

VI. AWARD ADMINISTRATION INFORMATION

A. Award Notices

All proposers submitting a proposal will receive a response from NASA either informing them their proposal has been rejected or selected to receive an award. Letters indicating acceptance should NOT be used as authorization to begin performance.

B. Administrative and National Policy Requirements

This solicitation does not invoke any special administrative or National policy requirements, nor do the awards that will be made involve any special terms and conditions that differ from NASA's general terms and conditions as given in the Handbook.

C. Reporting

At the time proposers are contacted regarding their successful proposals, NASA will discuss the required reporting for the award. It is anticipated that most research grants issued will require annual reports, most likely submitted electronically, similar to former ESE research grants. The Handbook, located at Web site (http://ec.msfc.nasa.gov/hq/grcover.htm), references the standard required reports for grants and cooperative agreements in Exhibit G.

D. Model Database

The Earth Science Enterprise is compiling a database of Earth Science models, analysis systems and assimilation systems developed in cooperation with NASA, or using NASA data. All successful proposers to this NRA will be required to provide information about their Earth Science models to this database. Information about your Earth Science model, analysis system, or assimilation system may be entered at http://www.esa.ssc.nasa.gov/m2m/admin/model_input/models.asp. For support in using this Web site you may contact Fritz Policelli at NASA Goddard Space Flight Center (301-614-6573; Fritz.S.Policelli@nasa.gov)

VII. NASA CONTACTS

Obtain additional information from:

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Donald E. Anderson
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VIII. CONCLUDING STATEMENT

NASA considers observations-based modeling of the Earth System to be essential in understanding and predicting Earth's climate, weather and natural hazards. NASA welcomes your participation and appreciates your cooperation in responding to this research announcement.

Ghassem R. Asrar
Associate Administrator for Earth Science

Appendices:
Appendix A High End Computing Guide
Appendix B – Amendatory Guidance to the General Guidelines Contained in Appendix C and Applicable Only to this NRA and Instructions for Proposers
Appendix C – Instructions for Responding to NASA Research Announcements
Appendix D – Required Proposal Cover Page
Appendix E – Proposal Cover Page Sample, Assurance of Compliance, and Certifications
Appendix F – Proposal Budget Summary Sheet and Instructions
Appendix G – Acronyms

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APPENDIX A
High End Computing Guide

It is recognized that the development of models and the research supported by this NRA may require a significant amount of computation resource. High End computing resources available from NASA are described below. Proposals that request centralized NASA High Performance Computing (HPC) resources must complete the attached requirements questionnaire.

NASA HPC Systems – NASA has two major computing facilities: the Earth and Space Data Computing Division (ESDCD) (http://esdcd.gsfc.nasa.gov) at Goddard Space Flight Center (GSFC) and the NASA Advanced Supercomputing (NAS) Division (http://www.nas.nasa.gov) at the Ames Research Center (ARC) each maintains a computation platform with significant amount of storage. A portion of the computing cycles will be reserved and allocated to support this NRA.

The main computing platform at GSFC is an HP/Compaq Alpha SC45 system consists of 1392 processors. This system will support computation modeling tasks ranging from single processor to as large as 256 processors. The system has been used successfully for long-term climate projections, ensemble seasonal-to-interannual forecast, and real-time weather forecasts.

The computing platforms at ARC will consist of multiple 512 processors SGI Altix 3500 systems. Each system is tightly coupled and is configured to support large computational tasks. lTasks requiring at least 64 processors will be allocated computing time on this system.

The computing resource request should include computing cycles required for model development, tuning, and experiments; the storage required for model outputs; and computing cycles required for data analysis. Additional technical support will be available to assist porting of software and to improve performance will be available.

For further information contact Tsengdar J. Lee, Mail code YS, NASA Headquarters, 300 E Street SW, Washington, DC 20546; Tsengdar.j.lee@nasa.gov; 202-358-0860.

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	FY05 Requirements	FY06 Requirements - Typical Job size

Project Information

1 First Name
2 Last Name
3 Organization
4 E-mail Address
5 Office Telephone

Please describe the current software status

6 Describe your Current Software/Application
7 Numerical Scheme(s) Used (e.g. finite difference, spectral, etc)
8 What is the typical Grid Resolution (e.g. lat X lonX lev)
9 On what platform(s) does the software currently run?
10 What is (are) the Processor Speed(s)?

Several of the following questions pertain to a "single job". We use this term to refer to a user-defined _convenient_ unit of application execution. E.g. for applications that are run under "batch queueing" environments, a job would typically be a single batch submission. Alternatively, a single job could be the computational work that an application completes between human interventions or the work completed between dumping a simulation's state to disk.

11 Do you predominately run one type and size of job?
If not, please answer questions 16-32 for the most typical job.
12 Wall-Clock time for single execution (minutes)
13 Is the existing performance acceptable, or do you require a faster time-to-solution?
14 If a faster time-to-solution is required, please indicate what an acceptable/desirable level of performance would be.
15 Number of processors (CPUs) per run
16 Number of runs (per Fiscal Year) for project duration
17 Will your usage be uniform over the year or will it be concentrated during a particular period?
18 If the work is concentrated please describe the profile.

Scaling behavior of the code

19 How well does your application scale with the number of processors?
20 If so, please describe (E.g. scales linearly throug # CPUs, estimated Amdahl efficiency of #%,...)
21 Parallelization Paradigm (MPI, OpenMP, PVM, pthreads, etc)

Memory requirements

22 What is the total memory requirement for your application?
23 If using distributed parallelism (e.g. MPI) how much memory is required _per process?
24 If you run multiple resolutions, can you estimate the memory as

a function of resolution

Disk storage requirements

25 Minimum amount of on-line disk storage for one run (in GB)

26 Total on-line disk storage (GB) desired for this activity.

27 Could the amounts above (questions 25 and 26) be reduced if efficient staging from tape-storage could be arranged?

Total archival storage

28 Amount of archived data from each run (in GB)

29 Total archived each year (in PB)

User Support

30 Do you require technical assistance with the software to address such as increases in complexity? (Y/N)

31 If yes, describe desired level of assistance

32 Is your model resolution/model or code complexity expected to change in the next year? (y/n)

33 If yes, answer requirements 11-29 for more complex jobs, excluding questions 19-21.

34 When do you anticipate that the more complex jobs will need to run (E.g. fall 2006)

APPENDIX B

Amendatory Guidance to the General Guidelines Contained in Appendix C and Applicable Only To this NRA and Instructions for Proposers

PURPOSE

These guidelines contain general and specific information regarding the submission of proposals in response to this NRA. Formats for submission of proposals for research related to this program are provided. Appendix C contains general instructions for responding to NRAs. Where conflicts exist between this Appendix and Appendix C, this appendix shall be the controlling document.

PROPOSAL CONTENT AND FORMAT

The proposal should provide sufficient detail to enable a reviewer to assess the value of the proposed research, its relation to the objectives of the NRA, and the probability that the investigators will be able to accomplish the stated objectives within the requested resources and schedule. Capabilities of the proposing organizations should be described including the experience of the Principal Investigator and any Co-Investigators. The proposal should be self-contained, and should not refer reviewers to external sources or Web sites for critical information. If color is used, proposers should ensure that all copies have color. To facilitate recycling, proposals should not be bound or in covers.

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A. Page Limits.

Proposers must adhere to the following page limits for proposals:

Cover Letter	1
Cover Page	1 - 2
Table of Contents	1
Abstract	1
Technical Plan	15 (30 for multi-investigator 5 year proposals)
List of References	2
Management Plan	2 (5 for multi-investigator 5 year proposals)
Cost Plan	8
Current and Pending Research	2 per investigator
Resumes	2 per investigator
Other	As few as possible

B. **Content Detail**

1. **Cover Letter**. Each proposal should be prefaced by a cover letter signed by an official of the investigator's institution who is authorized to legally bind the organization to the proposal and its content (unless the signature appears on the proposal itself). The cover letter should refer to the MAP 2004 NRA.

2. **Proposal Cover Page.** Please see Appendix D.

3. **Table of Contents**. A table of contents listing the page numbers for key sections of the proposal, including the cost and management plans, should be provided.

4. **Abstract** The abstract should summarize the research proposed in one page or less. It should contain a simple, concise overview of the investigation, its objectives, its scientific approach, expected results, and the value of its results to NASA's interdisciplinary research program.

5. **Technical Plan** The main body of the proposal should contain a full statement of the research to be undertaken and should describe key background, objectives, scientific relevance, technical approach, and expected significance of the work. The key elements of the project should be clearly identified and related to each other. The methods or approaches to be used should be described, and, as appropriate, the advantages of the selected methods or approaches over alternatives should be discussed. The anticipated results should be identified and their relation to the proposal's stated objectives and NASA's objectives, as outlined in the

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NRA, should be discussed. The research should be described in sufficient detail that peer reviewers can adequately assess the scientific methods and quality of the work proposed. Where resources from satellites or other data sources (e.g., aircraft sensors) are required, proposals should indicate whether a commitment has been made for access to the other systems or whether the required/desired data are available. The costs for such data should be included in the cost plan. The plan should also describe how any data products to be created or additional, ancillary data sets to be obtained will be shared with NASA, other investigators, and the broader scientific and user communities.

6. **References** A list of references cited in the technical plan must be provided. Each reference should include the title, names of all authors, book or journal, volume number, page numbers, and year of publication. While it is important to be concise, proposers should follow accepted scholarly practices in providing citations for source materials relied upon when preparing any section of the proposal.

7. **Management Plan** The Management Plan should outline the roles and responsibilities of all investigators and collaborators and indicate the relationships among these roles and responsibilities within the group. The management plan should also identify what contractor and/or non-institutional support is anticipated and who will be providing it. A schedule for reporting results and publishing papers should be described.

8. **Cost Plan for U.S. Proposals Only.** Please see Appendix F for specific guidance and forms. Contributions from any cost-sharing plan or other support for the proposed research should be detailed.

Costs for the acquisition, purchase, storage, or processing of all required data should be included. Also, costs for modeling, if proposed, should include all aspects of the process from writing software through computer operations and time. If use of NASA or other supercomputer resources is anticipated, an estimate of computational requirements (see Appendix A) should be included as part of the budget submission. Full costs for the purchase of data from commercial sources should be included in the budget and the requirement documented in the proposal.

To ensure adequate communications between investigators, proposers should plan for funds for two NASA-related meetings of three days duration and located in the U.S. during the course of their research.

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9. **Summary of Current and Pending Funding**. A list of current and pending research funding, to include the proposal name, funding agency, duration of research project, and total funding level, for all investigators should be included.

10. **Resumes.** Brief resumes for all named investigators should be appended to the proposal.

11. **Other Enclosures**. Reviewers are under no obligation to read any enclosures and proposals should thus be self-contained. Proposers may include other materials such as preprints or reprints of relevant publications, background on new measurement or analysis approaches, or letters of support and/or participation by scientists and/or institutions. Such materials are considered ancillary. Information in the Technical Plan of the proposal should stand alone. Other materials will not be evaluated

SELECTION PROCESS AND EVALUATION CRITERIA

The review of proposals submitted under this NRA will consist of a full peer review including external reviewers, which may involve a mail review, a panel review, or both. In addition to criteria for evaluation in Appendix C, the adequacy of facilities and ability and commitment of the investigator's institution to provide the necessary support to ensure that the investigation can be completed satisfactorily will be evaluated.

NASA reserves the right to select and make an award covering only a portion of a proposer's investigation, in which case the investigator will be given the opportunity to accept or decline such partial acceptance. In cases in which two or more proposals address similar problems and/or adopt similar approaches to data analysis, NASA may desire joint participation on the part of two or more proposers in a single project. If such overlap involves more than one funding organization, NASA and those organizations will confer and mutually agree to the disposition of those proposals.

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APPENDIX C
INSTRUCTIONS FOR RESPONDING TO NASA RESEARCH ANNOUNCEMENTS
(1852.235-72, OCTOBER 2002)

A. **General**

1. Proposals received in response to a NASA Research Announcement (NRA) will be used only for evaluation purposes. NASA does not allow a proposal, the contents of which are not available without restriction from another source, or any unique ideas submitted in response to an NRA to be used as the basis of a solicitation or in negotiation with other organizations, nor is a pre-award synopsis published for individual proposals.

2. A solicited proposal that results in a NASA award becomes part of the record of that transaction and may be available to the public on specific request; however, information or material that NASA and the awardee mutually agree to be of a privileged nature will be held in confidence to the extent permitted by law, including the Freedom of Information Act.

3. NRAs contain programmatic information and certain requirements that apply only to proposals prepared in response to that particular announcement. These instructions contain the general proposal preparation information that applies to responses to all NRAs.

4. A contract, grant, cooperative agreement, or other agreement may be used to accomplish an effort funded in response to an NRA. NASA will determine the appropriate award instrument. Contracts resulting from NRAs are subject to the Federal Acquisition Regulation and the NASA FAR Supplement. Any resultant grants or cooperative agreements will be awarded and administered in accordance with the NASA Grant and Cooperative Agreement Handbook (NPG 5800.1).

5. NASA does not have mandatory forms or formats for responses to NRAs; however, it is requested that proposals conform to the guidelines in these instructions. NASA may accept proposals without discussion; hence, proposals should initially be as complete as possible and be submitted on the proposers' most favorable terms.

6. To be considered for award, a submission must, at a minimum, present a specific project within the areas delineated by the NRA; contain sufficient technical and cost information to permit a meaningful evaluation; be signed by an official authorized to legally bind the

submitting organization; not merely offer to perform standard services or to just provide computer facilities or services; and not significantly duplicate a more specific current or pending NASA solicitation.

B. **NRA-Specific Items**

Several proposal submission items appear in the NRA itself: the unique NRA identifier; when to submit proposals; where to send proposals; number of copies required; and sources for more information. Items included in these instructions may be supplemented by the NRA.

C. **The following information is needed to permit consideration in an objective manner**

NRAs will generally specify topics for which additional information or greater detail is desirable. Each proposal copy shall contain all submitted material, including a copy of the transmittal letter if it contains substantive information.

1. **Proposal Transmittal Letter or Prefatory Material.**

(a) The legal name and address of the organization and specific division or campus identification if part of a larger organization;

(b) A brief, scientifically valid project title intelligible to a scientifically literate reader and suitable for use in the public press;

(c) Type of organization: e.g., profit, nonprofit, educational, small business, minority, women-owned, etc.;

(d) Name and telephone number of the principal investigator and business person nel who may be contacted during evaluation or negotiation;

(e) Identification of other organizations that are currently evaluating a proposal for the same efforts;

(f) Identification of the NRA, by number and title, to which the proposal is responding;

(g) Dollar amount requested, desired starting date, and duration of project;

(h) Date of submission; and

(i) Signature of a responsible official or authorized representative of the organization, or any other person authorized to legally bind the organization (unless the signature appears on the proposal itself).

2. **Restriction on Use and Disclosure of Proposal Information.** Information contained in proposals is used for evaluation purposes only. Offerors or quoters should, in order to

maximize protection of trade secrets or other information that is confidential or privileged, place the following notice on the title page of the proposal and specify the information subject to the notice by inserting an appropriate identification in the notice. In any event, information contained in proposals will be protected to the extent permitted by law, but NASA assumes no liability for use and disclosure of information not made subject to the notice.

Notice

Restriction on Use and Disclosure of Proposal Information

The information (data) contained in [insert page numbers or other identification] of this proposal constitutes a trade secret and/or information that is commercial or financial and confidential or privileged. It is furnished to the Government in confidence with the understanding that it will not, without permission of the offeror, be used or disclosed other than for evaluation purposes; provided, however, that in the event a contract (or other agreement) is awarded on the basis of this proposal the Government shall have the right to use and disclose this information (data) to the extent provided in the contract (or other agreement). This restriction does not limit the Government's right to use or disclose this information (data) if obtained from another source without restriction.

3. **Abstract.** Include a concise (200-300 word if not otherwise specified in the NRA) abstract describing the objective and the method of approach.

4. **Project Description.**

(a) The main body of the proposal shall be a detailed statement of the work to be undertaken and should include objectives and expected significance; relation to the present state of knowledge; and relation to previous work done on the project and to related work in progress elsewhere. The statement should outline the plan of work, including the broad design of experiments to be undertaken and a description of experimental methods and procedures. The project description should address the evaluation factors in these instructions and any specific factors in the NRA. Any substantial collaboration with individuals not referred to in the budget or use of consultants should be described. Subcontracting significant portions of a research project is discouraged.

(b) When it is expected that the effort will require more than one year, the proposal should cover the complete project to the extent that it can be reasonably anticipated. Principal emphasis should be on the first year of work, and the description should

distinguish clearly between the first year's work and work planned for subsequent years.

5. **Management Approach.** For large or complex efforts involving interactions among numerous individuals or other organizations, plans for distribution of responsibilities and arrangements for ensuring a coordinated effort should be described.

6. **Personnel.** The principal investigator is responsible for supervision of the work and participates in the conduct of the research regardless of whether or not compensated under the award. A short biographical sketch of the principal investigator, a list of principal publications and any exceptional qualifications should be included. Omit social security number and other personal items which do not merit consideration in evaluation of the proposal. Give similar biographical information on other senior professional personnel who will be directly associated with the project. Give the names and titles of any other scientists and technical personnel associated substantially with the project in an advisory capacity. Universities should list the approximate number of students or other assistants, together with information as to their level of academic attainment. Any special industry-university cooperative arrangements should be described.

7. **Facilities and Equipment**

(a) Describe available facilities and major items of equipment especially adapted or suited to the proposed project, and any additional major equipment that will be required. Identify any Government-owned facilities, industrial plant equipment, or special tooling that are proposed for use. Include evidence of its availability and the cognizant Government points of contact.

(b) Before requesting a major item of capital equipment, the proposer should determine if sharing or loan of equipment already within the organization is a feasible alternative. Where such arrangements cannot be made, the proposal should so state. The need for items that typically can be used for research and non-research purposes should be explained.

8. **Proposed Costs (U.S. Proposals Only)**

(a) Proposals should contain cost and technical parts in one volume: do not use separate "confidential" salary pages. As applicable, include separate cost estimates for salaries and wages; fringe benefits; equipment; expendable materials and supplies; services; domestic and foreign travel; ADP expenses; publication or page charges; consultants; subcontracts; other miscellaneous identifiable direct costs; and indirect costs. List

salaries and wages in appropriate organizational categories (e.g., principal investigator, other scientific and engineering professionals, graduate students, research assistants, and technicians and other non-professional personnel). Estimate all staffing data in terms of staff-months or fractions of full-time.

(b) Explanatory notes should accompany the cost proposal to provide identification and estimated cost of major capital equipment items to be acquired; purpose and estimated number and lengths of trips planned; basis for indirect cost computation (including date of most recent negotiation and cognizant agency); and clarification of other items in the cost proposal that are not self-evident. List estimated expenses as yearly requirements by major work phases.

(c) Allowable costs are governed by FAR Part 31 and the NASA FAR Supplement Part 1831 (and OMB Circulars A-21 for educational institutions and A-122 for nonprofit organizations).

(d) Use of NASA funds--NASA funding may not be used for foreign research efforts at any level, whether as a collaborator or a subcontract. The direct purchase of supplies and/or services, which do not constitute research, from non-U.S. sources by U.S. award recipients is permitted. Additionally, in accordance with the National Space Transportation Policy, use of a non-U.S. manufactured launch vehicle is permitted only on a no-exchange-of-funds basis.

9. **Security.** Proposals should not contain security classified material. If the research requires access to or may generate security classified information, the submitter will be required to comply with Government security regulations.

10. **Current Support.** For other current projects being conducted by the principal investigator, provide title of project, sponsoring agency, and ending date.

11. **Special Matters.**

(a) Include any required statements of environmental impact of the research, human subject or animal care provisions, conflict of interest, or on such other topics as may be required by the nature of the effort and current statutes, executive orders, or other current Government-wide guidelines.

(b) Identify and discuss risk factors and issues throughout the proposal where they are relevant, and your approach to managing these risks.

(c) Proposers should include a brief description of the organization, its facilities, and previous work experience in the field of the proposal. Identify the cognizant

Government audit agency, inspection agency, and administrative contracting officer, when applicable.

D. **Renewal Proposals**

1. Renewal proposals for existing awards will be considered in the same manner as proposals for new endeavors. A renewal proposal should not repeat all of the information that was in the original proposal. The renewal proposal should refer to its predecessor, update the parts that are no longer current, and indicate what elements of the research are expected to be covered during the period for which support is desired. A description of any significant findings since the most recent progress report should be included. The renewal proposal should treat, in reasonable detail, the plans for the next period, contain a cost estimate, and otherwise adhere to these instructions.

2. NASA may renew an effort either through amendment of an existing contract or by a new award.

E. **Length.** Unless otherwise specified in the NRA, effort should be made to keep proposals as brief as possible, concentrating on substantive material. Few proposals need exceed 15-20 pages. Necessary detailed information, such as reprints, should be included as attachments. A complete set of attachments is necessary for each copy of the proposal. As proposals are not returned, avoid use of "one-of-a-kind" attachments.

F. **Joint Proposals**

1. Where multiple organizations are involved, the proposal may be submitted by only one of them. It should clearly describe the role to be played by the other organizations and indicate the legal and managerial arrangements contemplated. In other instances, simultaneous submission of related proposals from each organization might be appropriate, in which case parallel awards would be made.

2. Where a project of a cooperative nature with NASA is contemplated, describe the contributions expected from any participating NASA investigator and agency facilities or equipment which may be required. The proposal must be confined only to that which the proposing organization can commit itself. "Joint" proposals which specify the internal arrangements NASA will actually make are not acceptable as a means of establishing an

agency commitment.

G. **Late Proposals.** Proposals or proposal modifications received after the latest date specified for receipt may be considered if a significant reduction in cost to the Government is probable or if there are significant technical advantages, as compared with proposals previously received.

H. **Withdrawal.** Proposals may be withdrawn by the proposer at any time before award. Offerors are requested to notify NASA if the proposal is funded by another organization or of other changed circumstances which dictate termination of evaluation.

I. **Evaluation Factors.**

1. Unless otherwise specified in the NRA, the principal elements (of approximately equal weight) considered in evaluating a proposal are its relevance to NASA's objectives, intrinsic merit, and cost.

2. Evaluation of a proposal's relevance to NASA's objectives includes the consideration of the potential contribution of the effort to NASA's mission.

3. Evaluation of its intrinsic merit includes the consideration of the following factors of equal importance:

(a) Overall scientific or technical merit of the proposal or unique and innovative methods, approaches, or concepts demonstrated by the proposal.

(b) Offeror's capabilities, related experience, facilities, techniques, or unique combinations of these which are integral factors for achieving the proposal objectives.

(c) The qualifications, capabilities, and experience of the proposed principal investigator, team leader, or key personnel critical in achieving the proposal objectives.

(d) Overall standing among similar proposals and/or evaluation against the state-of-the-art.

4. Evaluation of the cost of a proposed effort may include the realism and reasonableness of the proposed cost and available funds.

(a) **Evaluation Techniques.** Selection decisions will be made following peer and/or scientific review of the proposals. Several evaluation techniques are regularly used within NASA. In all cases proposals are subject to scientific review by discipline

specialists in the area of the proposal. Some proposals are reviewed entirely in-house, others are evaluated by a combination of in-house and selected external reviewers, while yet others are subject to the full external peer review technique (with due regard for conflict-of-interest and protection of proposal information), such as by mail or through assembled panels. The final decisions are made by a NASA selecting official. A proposal which is scientifically and programmatically meritorious, but not selected for award during its initial review, may be included in subsequent reviews unless the proposer requests otherwise.

K. **Selection for Award.**

1. When a proposal is not selected for award, the proposer will be notified. NASA will explain generally why the proposal was not selected. Proposers desiring additional information may contact the selecting official who will arrange a debriefing.

2. When a proposal is selected for award, negotiation and award will be handled by the procurement office in the funding installation. The proposal is used as the basis for negotiation. The contracting officer may request certain business data and may forward a model award instrument and other information pertinent to negotiation.

L. **Additional Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.**

1. NASA welcomes proposals from outside the U.S. However, foreign entities are generally not eligible for funding from NASA. Therefore, unless otherwise noted in the NRA, proposals from foreign entities should not include a cost plan unless the proposal involves collaboration with a U.S. institution, in which case a cost plan for only the participation of the U.S. entity must be included. Proposals from foreign entities and proposals from U.S. entities that include foreign participation must be endorsed by the respective government agency or funding/sponsoring institution in the country from which the foreign entity is proposing. Such endorsement should indicate that the proposal merits careful consideration by NASA, and if the proposal is selected, sufficient funds will be made available to undertake the activity as proposed.

2. All foreign proposals must be typewritten in English and comply with all other submission requirements stated in the NRA. All foreign proposals will undergo the same evaluation and

selection process as those originating in the U.S. All proposals must be received before the established closing date. Those received after the closing date will be treated in accordance with paragraph (g) of this provision. Sponsoring foreign government agencies or funding institutions may, in exceptional situations, forward a proposal without endorsement if endorsement is not possible before the announced closing date. In such cases, the NASA sponsoring office should be advised when a decision on endorsement can be expected.

3. Successful and unsuccessful foreign entities will be contacted directly by the NASA sponsoring office. Copies of these letters will be sent to the foreign sponsor. Should a foreign proposal or a U.S. proposal with foreign participation be selected, NASA's Office of External Relations will arrange with the foreign sponsor for the proposed participation on a no-exchange-of-funds basis, in which NASA and the non-U.S. sponsoring agency or funding institution will each bear the cost of discharging their respective responsibilities.

4. Depending on the nature and extent of the proposed cooperation, these arrangements may entail:

(a) An exchange of letters between NASA and the foreign sponsor**;** or

(b) A formal Agency-to-Agency Memorandum of Understanding (MOU).

M. **Cancellation of NRA.**

NASA reserves the right to make no awards under this NRA and to cancel this NRA. NASA assumes no liability for canceling the NRA or for anyone's failure to receive actual notice of cancellation.

2. ADDITIONAL INSTRUCTIONS

(a) **Export Control Guidelines Applicable to Foreign Proposals and Proposals Including Foreign Participation.**

U.S. proposals including foreign participation must include a section discussing compliance with U.S. export laws and regulations, e.g., 22 CFR Parts 120-130 and 15 CFR Parts 730-774, as applicable to the circumstances surrounding the particular foreign participation. The discussion must describe in detail the proposed foreign participation and is to include, but not limited to, whether or not the foreign participation may require the prospective proposer to obtain the prior approval of the Department of State or the Department of Commerce via a

technical assistance agreement or an export license, or whether a license exemption/exception may apply. If prior approvals via licenses are necessary, discuss whether the license has been applied for or if not, the projected timing of the application and any implications for the schedule. Information regarding U.S. export regulations is available at *http://www.pmdtc.org* and *http://www.bis.doc.gov*. Proposers are advised that under U.S. law and regulations, spacecraft and their specifically designed, modified, or configured systems, components, and parts are generally considered "Defense Articles" on the United States Munitions List and subject to the provisions of the International Traffic in Arms Regulations (ITAR), 22 CFR Parts 120-130.

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APPENDIX D
Proposal Cover Page

Two steps are required to submit a cover page. The first step is to complete the proposal cover page (see the SAMPLE below) **electronically** through the SYS-EYFUS Web site located at *http://proposals.hq.nasa.gov*. If the proposer obtained a User ID and password in the process of submitting a proposal for a previous research opportunity announcement, the same user UserID and password can be used to complete the electronic proposal cover page in response to this research opportunity announcement. Be sure to click on "Edit Personal Information" if any of your correspondence information in SYS-EYFUS is not current.

The second step is to print a **hard copy** of the electronic cover page that must be signed by the Principal Investigator and an official by title of the investigator's organization who is authorized to commit the organization. This authorizing signature also certifies that the proposing institution has read and is in compliance with the required certifications printed in full, therefore, these certifications do not need to be submitted separately. This page will not be counted against the page limit of the proposal.

If you do not have a SYS-EYFUS UserID or password, you may obtain one electronically by going to *http://proposals.hq.nasa.gov* and performing the following steps:

1. Click the hyperlink for **new user** that will take you to the Personal Information Search Page.
2. Enter your first and last name. SYS-EYFUS will **search** for your record information in the SYS-EYFUS database.
3. Confirm your personal information by **choosing** the record displayed.
4. Select **continue**, and a User ID and password will be e-mailed to you.

Once you receive your User ID and Password, **login** to the SYS-EYFUS Web site and follow the instructions for **New Proposal Cover Page.**

Proposers without access to the web or who experience difficulty in using this site may contact the Help Desk at **proposals@hq.nasa.gov** (or call 202-479-9376) for assistance. After you have submitted your notice of intent or proposal cover page electronically, if you are unsure if it has been successfully submitted, **do not re-submit**. Please call the Help Desk. They will be able to promptly tell you if your submission has been received. Please note that submission of the electronic cover page does not satisfy the deadline for proposal submission.

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APPENDIX E

SAMPLE

PROPOSAL COVER PAGE

(Date : Oct 24, 2003)

NEWS/03-1-0000-0013

Name of Submitting Institution: IDI

Congressional District: 8

Certification of Compliance with Applicable Executive Orders and U.S. Code

By submitting the proposal identified in this Cover Sheet/Proposal Summary in response to this Research Announcement, the Authorizing Official of the proposing institution (or the individual proposer if there is no proposing institution) as identified below:
· certifies that the statements made in this proposal are true and complete to the best of his/her knowledge;
· agrees to accept the obligations to comply with NASA award terms and conditions if an award is made as a result of this proposal; and
· confirms compliance with all provisions, rules, and stipulations set forth in the two Certifications contained in this NRA [namely, (i) Assurance of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs, and (ii) Certifications, Disclosures, And Assurances Regarding Lobbying and Debarment & Suspension]. Willful provision of false information in this proposal and/or its supporting documents, or in reports required under an ensuing award, is a criminal offense (U.S. Code, Title 18, Section 1001).

NASA PROCEDURE FOR HANDLING PROPOSALS

This proposal shall be used and disclosed for evaluation purposes only, and a copy of this Government notice shall be applied to any reproduction or abstract thereof. Any authorized restrictive notices that the submitter places on this proposal shall also be strictly complied with. Disclosure of this proposal for any reason outside the Government evaluation purposes shall be made only to the extent authorized by the Government.

[1] ... PI Information

Name:		Email:	
Organization:		Department:	
Mail Stop:		Telephone:	
Address:		Fax:	
Address:			
City, State, Zip:		Country:	

PI Signature and Date:

Authorizing Official:		**Email:**	
Title:		**Phone:**	
Institution:			
Address:			

AO Signature and Date:

[2] ... Team Member

[3] ... Proposal Title (Short and/or Full)

Short Title:	
Full Title:	

[4] ... Summary

[5] ... NEWS Proposal

Type of NEWS Proposal:	

[6] ... Budget

Continue

Edit Proposal

Assurance of Compliance with the NASA Regulations Pursuant to Nondiscrimination in Federally Assisted Programs

The *(Institution, corporation, firm, or other organization on whose behalf this assurance is signed, hereinafter called "Applicant ")* hereby agrees that it will comply with Title VI of the Civil Rights Act of 1964 (P.L. 88-352), Title IX of the Education Amendments of 1972 (20 U.S.C. 1680 et seq.), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. 794), and the Age Discrimination Act of 1975 (42 U.S.C. 16101 et seq.), and all requirements imposed by or pursuant to the Regulation of the National Aeronautics and Space Administration (14 CFR Part 1250) (hereinafter called "NASA") issued pursuant to these laws, to the end that in accordance with these laws and regulations, no person in the United States shall, on the basis of race, color, national origin, sex, handicapped condition, or age be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity for which the Applicant receives federal financial assistance from NASA; and hereby give assurance that it will immediately take any measure necessary to effectuate this agreement.

If any real property or structure thereon is provided or improved with the aid of federal financial assistance extended to the Applicant by NASA, this assurance shall obligate the Applicant, or in the case of any transfer of such property, any transferee, for the period during which the real property or structure is used for a purpose for which the federal financial assistance is extended or for another purpose involving the provision of similar services or benefits. If any personal property is so provided, this assurance shall obligate the Applicant for the period during which it retains ownership or possession of the property. In all other cases, this assurance shall obligate the Applicant for the period during which the federal financial assistance is extended to it by NASA.

This assurance is given in consideration of and for the purpose of obtaining any and all federal grants, loans, contracts, property, discounts, or other federal financial assistance extended after the date hereof to the Applicant by NASA, including installment payments after such date on account of applications for federal financial assistance which were approved before such date. The Applicant recognizes and agrees that such federal financial assistance will be extended in reliance on the representations and agreements made in this assurance, and that the United States shall have the right to seek judicial enforcement of this assurance. This assurance is binding on the Applicant, its successors, transferees, and assignees, and the person or persons whose signatures appear on the Proposal Cover Sheet above are authorized to sign on behalf of the Applicant.

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CERTIFICATIONS, DISCLOSURES, AND ASSURANCES
REGARDING LOBBYING AND DEBARMENT & SUSPENSION

LOBBYING

As required by Section 1352, Title 31 of the U.S. Code, and implemented at 14 CFR Part 1271, as defined at 14 CFR Subparts 1271.110 and 1260.117, with each submission that initiates agency consideration of such applicant for award of a Federal contract, grant, or cooperative agreement exceeding $ 100,000, the applicant must **certify** that:

1. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned to any person for influencing or attempting to influence an officer or employee of an agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.
2. If any funds other than appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit a Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.
3. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

2. GOVERNMENTWIDE DEBARMENT AND SUSPENSION

As required by Executive Order 12549, and implemented at 14 CFR 1260.510, for prospective participants in primary covered transactions, as defined at 14 CFR Subparts 1265.510 and 1260.117—

1. The prospective primary participant **certifies** to the best of its knowledge and belief, that it and its principals:
    (a) Are not presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded by any Federal department or agency;
    (b) Have not within a three-year period preceding this proposal been convicted of or had a civil judgment rendered against them for commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State or local) transaction or contract under a public transaction; violation of Federal or State antitrust statutes or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, or receiving stolen property;
    (c) Are not presently indicted for or otherwise criminally or civilly charged by a governmental entity (Federal, State or local) with commission of any of the offenses enumerated in paragraph (l)(b) of this certification; and
    (d) Have not within a three-year period preceding this application/proposal had one or more public transactions (Federal, State or local) terminated for cause or default.
2. Where the prospective primary participant is unable to certify to any of the statements in this certification, such prospective participant shall attach an explanation to this proposal.

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APPENDIX F

PROPOSAL BUDGET SUMMARY

For period from **April 1, 2005** to ___*(March. 31, 2008 or March. 31, 2010)*

• Assume a **April 1, 2005** project start date.
• Enter the proposed estimated costs in each column.
• Provide as attachments detailed computations of all estimates in each cost category with narratives as required to fully explain each proposed cost. See *Instructions for Budget Summary* on following page for details.

	Year 1	Year 2	Year 3	Year 4	Year 5	Total
1. **Direct Labor** (salaries, wages, and fringe benefits)						
2. **Other Direct Costs:**						
a. Subcontracts						
b. Consultants						
c. Equipment						
d. Supplies						
e. Travel						
f. Data Costs						
g. Other						
3. **Facilities and Administrative Costs**						
4. **Other Applicable Costs:**						
5. SUBTOTAL--Estimated Costs						
6. **Less Proposed Cost Sharing (if any)**						
7. Total NASA-ESE Cost						

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INSTRUCTIONS FOR PROPOSAL BUDGET SUMMARY

During the next several years, NASA must effectively and efficiently implement a variety of new Federal and Agency standards and initiatives to support long-term financial and resources management excellence. These standards include recent Federal standards related to managerial cost accounting (full costing). The NASA full cost concept and approach integrates full-cost accounting, budgeting, and management practices to enhance cost-effective mission performance by providing complete cost information for improved (more fully informed) decision making and management. The initiative introduces a concept that ties all Agency costs (including all Civil Service and other personnel costs) to major activities (programs and projects) and budgets, accounts, reports, and manage programs and projects from a full cost perspective.

Therefore, proposals submitted to this NRA should report their full cost including all contributions on lines 1-5 of the required budget page. Every effort should be made to account for the full cost including contributed expenses (such as facilities, salaries, benefits etc.) by partner universities, agencies and NASA centers (i.e. civil service salaries, benefits, travel, and training) as these will be seen to strengthen the proposal's merits. The portion of the full project cost contributed by the proposing institution or its partners should be explicitly specified on line 6, and detailed in the attached budget explanation. Then, the actual funding requested from NASA-ESE in support of the proposal should be summarized on line 7. Since partner contributions generally strengthen proposed projects and benefit NASA-ESE, the guidance on suggested proposal cost caps for this announcement applies to the NASA-ESE cost on line 7.

General Instruction

- Provide specific and complete data as requested below.
- When "Basis of Estimate" is requested, this means provide the details and methodology used to determine the estimate.
- Costs on the Budget Summary Sheet with no supporting rationale or basis of estimate will be considered incomplete, and proposal scores will reflect this lack of supporting information.
- If more than one institution is involved, provide a separate budget sheet for each institution, plus a summary budget sheet for the complete project.
- Cost data are **not** included in page count limitations.
- All costs, including those for high-end scientific computing required to meet

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proposed project goals should be included in the budget request.

1. **Direct Labor (salaries, wages, and fringe benefits).** Attachments should list the number and titles of personnel, amounts of time to be devoted to the grant, and fully-burdened rates of pay. This item should include all labor costs, including those contributed by the proposing institution.

2. **Other Direct Costs**.

(a) **Subcontracts:** Attachments should describe the work to be subcontracted, estimated amount, recipient (if known), and the reason for subcontracting.

(b) **Consultants**: Identify consultants to be used, why they are necessary, the time they will spend on the project, and rates of pay.

(c) **Equipment:** List separately. Explain the need for items costing more than $500. Describe basis for estimated cost. General purpose equipment is not allowable as a direct cost unless specifically approved by the NASA Grant Officer. Any equipment purchase requested to be made as a direct charge under this award must include the equipment description, how it will be used in the conduct of the basic research proposed and why it cannot be purchased with indirect funds. General purpose personal computers may not be included unless specifically approved by the NASA Grant Officer.

(d) **Supplies:** Provide general categories of needed supplies, the method of acquisition, and the estimated cost.

(e) **Travel:** Describe the purpose of the proposed travel in relation to the award and provide the basis of estimate, including information on destination, number of days, and number of travelers.

(f) Enter estimated cost of commercial data and public data sets. Include itemized list indicating type of data, from whom it will be purchased, quantity and cost.

(g) **Other**: Enter the total of direct costs not covered by 2a through 2e. Attach an itemized list explaining the need for each item and the basis for the estimate.

3. **Facilities and Administrative (F&A) Costs**. Identify F&A cost rate(s) and base(s) as approved by the cognizant Federal agency, including the effective period of the rate. Provide the name, address, and telephone number of the Federal agency official having cognizance. If unapproved rates are used, explain why, and include the computational basis for the indirect expense pool and corresponding allocation base for each rate.

4. **Other Applicable Costs.** Enter total explaining the need for each item.

5. **Subtotal-Estimated Costs.** Enter the sum of items 1 through 4.

6. **Less Proposed Cost Sharing (if any).** Enter any amount proposed. If cost sharing is based on specific cost items, identify each item and amount in an attachment. This item should include any contributions reported in items 1-5 that will be supported from sources other than this budget request.

7. **Total NASA Cost.** Enter the total after subtracting item 6 from item 5.

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APPENDIX G

Acronyms

4DDA	4-dimensional data assimilation
AGU	American Geophysical Union http://www.agu.org
AMS	American Meteorological Society http://www.ametsoc.org
ARM	Atmospheric Radiation Measurement Program http://www.arm.gov
CCRI	Climate Change Research Initiative http://www.usgcrp.gov/usgcrp/Library/CCRIreport-aug2001
CCSP	US Climate Change Science Program http://www.climatescience.gov
CEOP	Coordinated Enhanced Observation Period http://www.gewex.org/ceop.htm
CEOS	Committee on Earth Observation Satellites http://disaster.ceos.org
CLiC	Climate and the Cryosphere http://clic.npolar.no
CLIVAR	Climate Variability and Predictability http://www.clivar.org
CLPX	Cold Land Processes Experiment http://www.nohrsc.nws.gov/~cline/clp.html
DDS	Decision Support Systems
ESE	Earth Science Enterprise http://earth.nasa.gov
F&A	Facilities and Administrative Costs
GAPP	GEWEX Americas Prediction Project http://www.ogp.noaa.gov/mpe/gapp
GCOS	Global Climate Observing System http://www.wmo.ch/web/gcos/gcoshome.html
GCSS	GEWEX Cloud System Study http://www.gewex.org/gcss.html
GEWEX	Global Energy and Water Experiment http://www.gewex.org
GEWEX-DIME	Cloud System Study Data Integration for Model Evaluation http://gcss-dime.giss.nasa.gov/
GMAO	Global Modeling and Assimilation Office http://gmao.gsfc.nasa.gov/sci_research/
GMI	Global Modeling Initiative http://gmi.gsfc.nasa.gov/gmi.html
GRACE	Gravity Recovery and Climate Experiment http://www.csr.utexas.edu/grace
GWEC	Global Water and Energy Cycle Program

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IGOS	Integrated Global Observing Strategy http://www.igospartners.org
LBA	Large Scale Biosphere-Atmosphere Experiment in Amazonia http://daac.ornl.gov/lba_cptec/lba/indexi.html
LCLUC	Land Cover and Land Use Change http://lcluc.gsfc.nasa.gov
NASA	National Aeronautics and Space Administration http://www.nasa.gov
NEESPI	Northern Eurasia Earth Science Partnership Initiative http://neespi.gsfc.nasa.gov
NEWS	NASA Energy- and Water-Cycle Study http://news.gsfc.nasa.gov
NRA	NASA Research Announcement http://research.hq.nasa.gov
OMB	Office of Management and Budget http://www.whitehouse.gov/omb
OSEs	Observing System Experiments
OSSEs	Observing Simulation System Experiments http://gmao.gsfc.nasa.gov/sci_highlights/osse/index.php
OSTP	Office of Science and Technology Policy http://www.ostp.gov
PI	Principal Investigator
SMEX	Soil Moisture Experiments http://hydrolab.arsusda.gov/smex02
THP	Terrestrial Hydrology Program http://thp.gsfc.nasa.gov
USAID	US Agency for International Development http://www.usaid.gov
USGCRP	US Global Change Research Program http://www.usgcrp.gov
WCRP	World Climate Research Programme http://www.wmo.ch/web/wcrp/wcrp-home.html
WMO	World Meteorological Organization http://www.wmo.ch
WMP	Water Management Program http://wmp.gsfc.nasa.gov

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